A-18

Dynamic and Static Aspects of Bimodal Colloidal Suspension

M. Sikorski, A. Sandy, and S. Narayanan

Advanced Photon Source, Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439

Structure and dynamics of bimodal suspensions of latex spheres in supercooled glycerol were investigated using coherent synchrotron radiation via small-angle x-ray scattering and x-ray photon correlation spectroscopy. The purpose of this work was determine the correlation between microstructure and observed dynamics for moderately concentrated bimodal colloidal suspensions with the size ratio of the constituent species close to five, which is large enough to show a well-pronounced depletion effect but not sufficient for the small spheres to fill exactly the space between the big ones. Measurements were performed for a series of samples spanning the full range of relative concentration ratios of large-to-small species. The arrangement of large particles was found to be well described in the frame work of the sticky hard spheres model. Strength of the attraction between large spheres is inversely proportional to their concentration. Outcome from the structure analysis is in good agreement with x-ray photon correlation spectroscopy data. All bimodal suspensions show dramatic slowing down of dynamics as compared to monomodal cases. This effect becomes less pronounced with increasing concentration of large spheres. Beside largest length scales at highest applied temperature, the intermediate scattering function followed stretched exponential scheme. Both characteristic time scale for particle motion and stretched exponent show nontrivial wave-vector dependence. Model assuming depletion effect driven phase separation and formation of monomodal domains was proposed to explain obtained data.